

Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 8636 WO GI-FRI	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/EP2004/003487	International filing date (day/month/year) 02.04.2004	Priority date (day/month/year) 07.04.2003
International Patent Classification (IPC) or national classification and IPC		
Applicant ZF FRIEDRICHSHAFEN AG		

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>7</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>																									
<p>4. This report contains indications relating to the following items:</p> <table border="0"> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>		<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
<input checked="" type="checkbox"/>	Box No. I	Basis of the report																							
<input type="checkbox"/>	Box No. II	Priority																							
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability																							
<input type="checkbox"/>	Box No. IV	Lack of unity of invention																							
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement																							
<input type="checkbox"/>	Box No. VI	Certain documents cited																							
<input type="checkbox"/>	Box No. VII	Certain defects in the international application																							
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application																							

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2004/003487

Box No. I

Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
 - ☐ international search (Rule 12.3 and 23.1(b))
 - ☐ publication of the international application (Rule 12.4)
 - ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
 - ☐ the international application as originally filed/furnished
 - ☒ the description:
 - pages 1-19 _____ as originally filed/furnished
 - pages* _____ received by this Authority on _____
 - pages* _____ received by this Authority on _____
 - ☒ the claims:
 - nos. 1-23 _____ as originally filed/furnished
 - nos.* _____ as amended (together with any statement) under Article 19
 - nos.* _____ received by this Authority on _____
 - nos.* _____ received by this Authority on _____
 - ☒ the drawings:
 - sheets 1/5-5/5 _____ as originally filed/furnished
 - sheets* _____ received by this Authority on _____
 - sheets* _____ received by this Authority on _____
 - ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages _____
 - ☐ the claims, nos. _____
 - ☐ the drawings, sheets/figs _____
 - ☐ the sequence listing (*specify*): _____
 - ☐ any table(s) related to sequence listing (*specify*): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages _____
 - ☐ the claims, nos. _____
 - ☐ the drawings, sheets/figs _____
 - ☐ the sequence listing (*specify*): _____
 - ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2004/003487

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	1-23	YES
	Claims		NO
Inventive step (IS)	Claims	1-23	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-23	YES
	Claims		NO
2. Citations and explanations (Rule 70.7)			
1 This report refers to the following documents:			
D1: DE 102 13 820 A (AISIN AW CO) 10 October 2002 (2002-10-10)			
D2: PATENT ABSTRACTS OF JAPAN Vol. 2002, No. 11, 6 November 2002 (2002-11-06) & JP 2002 213545 A (AISIN AW CO LTD) 31 July 2002 (2002-07-31)			
D3: US 6 425 841 B1 (HAKA RAYMOND JAMES) 30 July 2002 (2002-07-30).			
2 Document D1 is considered the closest prior art. It discloses (in figure 7) all the features of the preamble of claim 1, as set out in the description of the present application (pages 1-3 and figure 1).			
The subject matter of independent claim 1 differs from the disclosure in document D1 in that:			
- the primary gear set has an additional third rear-mounted gear set, wherein			
- a sun gear of the third rear-mounted gear set is coupled to the sun gear of the second rear- mounted gear set,			

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- a web of the third rear-mounted gear set is coupled to the web of the second rear-mounted gear set,
- a ring gear of the third rear-mounted gear set can be coupled to the ring gear of the front-mounted gear set via the first shift element,
- to connect the output shaft and the coupled webs of the second and third rear-mounted gear set a connecting element is provided which, in three-dimensional view, radially fully overlaps axially between the ring gears of the second and the third rear-mounted gear set in the axial direction, and
- the input shaft and output shaft are disposed coaxially relative to each other.

2.1 The subject matter of claim 1 is therefore novel (PCT Article 33(2)).

The problem to be solved by the present invention is therefore understood to be that of modifying the gearbox structure known from document D1 in such a way that the gearbox can be fitted into a motor vehicle having a standard drive system (coaxial structure) without thereby having to dispense with the use of a Simpson planetary gear.

2.2 The solution to this problem, as proposed in claim 1 of the present application, involves an inventive step (PCT Article 33(3)), for the following reasons:

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
-----------	---

Although solutions involving the coaxial arrangement of the input and output shafts are known from the document D1 (see figure 1), this solution involves a Ravigneaux gear set. Document D2 also discloses gearboxes having a coaxial structure and using a Simpson gear set. Neither the front-mounted gear set nor the primary gear set, however, have the features of the claimed solution. Lastly, document D3 likewise discloses a gearbox having a coaxial arrangement, comprising a Simpson gear set and a front-mounted gear set according to the invention. However, the primary gear set of document D3 differs from the claimed primary gear set in that it has only two rear-mounted gear sets.

2.3 Claims 2-5 are dependent on claim 1 and therefore likewise meet the PCT requirements for novelty and inventive step.

3 Document D1 is also considered the prior art closest to the subject matter of claim 6. As already mentioned in point 2. above, document D1, figure 7, discloses all the features of the preamble of claim 1 and therefore all the features of the preamble of claim 6, including the following features of the characterizing part (see figure 7):

- the primary gear set has a second rear-mounted gear set (G3),
- the ring gear (R2) of the second rear-mounted

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
-----------	---

gear set can be fixed to the gearbox housing by the sixth shift element (B-1),

- the sun gear (S2) of the second rear-mounted gear set is connected to the sun gear (S3) of the first rear-mounted gear set,
- the web (C2) of the second rear-mounted gear set is connected to the ring gear of the first rear-mounted gear set.

The subject matter of independent claim 6 differs from the disclosure in document D1 in that:

- the second rear-mounted gear set is a coupled rear-mounted gear set having two ring gears,
- planetary gears mounted on a web of the coupled rear-mounted gear set mesh with one sun gear and both ring gears of the coupled rear-mounted gear set,
- the second ring gear of the coupled rear-mounted gear set can be connected to the ring gear of the front-mounted gear set by the first shift element,
- to connect the output shaft and the webs of the coupled rear-mounted gear set a connecting element is provided which, in three-dimensional view, axially reaches between the ring gears of the coupled rear-mounted gear set and, seen in the axial direction, radially fully extends over the second ring gear of the coupled rear-mounted gear set, and
- the input shaft and the output shaft are disposed coaxially relative to each other.

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
-----------	---

- 3.1 The subject matter of claim 6 is therefore novel (PCT Article 33(2)).

The problem to be solved by the present invention is the one set out in point 2.1.

- 3.2 The solution to this problem, as proposed in claim 6 of the present application, involves an inventive step (PCT Article 33(3)), for the following reasons:

The subject matter of claim 6 differs from that of claim 1 in that the second and third rear-mounted gear sets are replaced with a coupled rear-mounted gear set having two ring gears. A solution of this kind cannot be derived from a combination of the known documents D1 to D3.

- 3.3 Claims 7-23 are dependent on claim 1 and/or claim 6 and therefore likewise meet the PCT requirements for novelty and inventive step.